

- Fig. 5. Typical forewing of *Aleurodicus*.  
 6. Leg of adult.  
 7. Leg showing three claws on tarsus.  
 8. Male genital organs and vasiform orifice, dorsal view.  
 9. Side view of vasiform orifice of male.  
 10. Female genital organs, ventral view.  
 11. Head of adult, side view.  
 12. " " " front view.  
 13. Egg.  
 14. Typical vasiform orifice.

*Silajit : an ancient Eastern Medicine*.—By DAVID HOOPER, F.C.S.

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One of the most peculiar medicinal substances of the East is that called *Silajit* or *Shilajaṭu*. It is known by the former name in Hindi and Persian, and by the latter in Bengali and Sanskrit. The meaning of the term is derived from *Sila*=a stone, and *jatu*=produce or essence. It may therefore be regarded as a substance born of the rock, essence of stone, or, more literally, "rock sweat."

The localities in which this article is reported to be found are confined to Northern India. It is obtained from the lower, central and upper ranges of the Himalayas and the Vindhyan hills, and is procurable in Simla, Mussoorie, and Katmandu. In Vadarikasvan, near Hardwar, a sacred retreat at the foot of the Himalayas, it is fairly abundant. It is brought down by Bhuteas and other hill tribes, and sold with such commodities as brick tea, incense, gums and precious stones.

The occurrence and formation of *silajit* is at present somewhat obscure. It appears as an exudation upon rocks, and, according to report, is contained in the substance of the rock. *Silajit* is collected during the hot weather in May and June, the heat of the sun is said to be necessary in drawing out the extract from the rocks. In Sanskrit works it is stated that *silajatu* imbibes the therapeutic properties of the metals with which it remains associated. The black variety, which is the most commonly available, is said to possess the properties of iron, and the white variety is said to exert the peculiar action of silver. The manner in which this exudation occurs, and the kinds of rocks which afford it, are matters requiring investigation. The collection is in the hands of shepherds and nomadic tribes, who can, of course, furnish no intelligent

account of its nature, or explain its origin with any degree of satisfaction.

Before describing what is at present recognised as medicinal silajit, it will be convenient to allude to the varieties of substances under this name which have been mentioned in Indian works or met with in the bazars.

In the first place, there is a kind of silajit which is of a mineral nature, and is a more or less pure native aluminium sulphate. This was described in 1833, by Mr. J. Stevenson, Superintendent of the Behar Saltpetre Factory (*Jour. As. Soc. Beng.* II. 321). It was found in Nepal, and was widely used as a medicine to cure green wounds and bruises. It occurred in small brownish-white lumps with a semi-crystalline structure internally. It consisted of 95 per cent. of aluminium sulphate with 3 per cent. of iron. It sold for the high price of two rupees for a rupee weight. In the same year Dr. A. Campbell, in a letter to the Asiatic Society, (*Jour. As. Soc. Beng.* II. 482) confirmed the existence and use of the alum earth, and stated that the average qualities contained only 66 per cent. of aluminium sulphate. The price of the product at Katmandu was from Rs. 11 to Rs. 15 a maund, but sold as a drug in the bazar, its price was purely fanciful. The rocks, it was suggested, might be lixiviated and be made to yield a larger supply, but it is very improbable that it could be obtained in sufficient quantities to be of commercial importance.

Mineral silajit was again referred to in 1846, by Capt. Sherwell in his account of Behar (*Journ. As. Soc. Beng.* XV. 58). This officer reported that a small quantity of alum was manufactured from shales in the Shahabad District; these rocks probably belonged to the pyritous shales of the Kaimur group of the Vindhyan series. The alum was sold at the high price of one rupee a tola. It was identical with the silajit of Nepal and was much esteemed as a drug.

That the mineral silajit does not all come from Nepal is confirmed by Dr. Hamilton in his account of Nepal, where he says: "I have collected Salajit in Behar with my own hands."

In the "Economic Geology of India," it is recorded that alum exudations or *silajit* are sometimes collected by the natives of Assam.

More recent geological investigations in India have not brought to light any fresh information regarding this aluminous mineral under the name of silajit, and although fresh deposits have been discovered, such as those in Baluchistan where it is called "*Phul-Mak*," they have not been regarded as medicinal.

The second variety of this substance, called Black Silajit, is quite a different article to that just described. It is sold in the bazars of Calcutta,

in Dehra Dun and Hardwar. The Kabirājīs are aware of the distinction between the two products, and hold out a warning that the Nepal alum earth is not the silajit of Sanskrit writers; they state that the former is an article of Yunāni medicine, while the latter, or black kind, is only suitable for Hindu practitioners.

Dr. Campbell appears to be the first to discriminate between the two drugs. He says (*Jour. As. Soc. Beng.* II. 483): "There is a dark bituminous substance used in Nepal, said to exude from rocks, and is called "Black Salajit." It resembles bituminous alum ore, but there is much vegetable matter in it, and it is probably a vegetable production, notwithstanding the belief by the Nepal physicians of its mineral nature."

Black silajit is sold in the form of brown or black cakes, tough or pasty in consistence, and having an odour of rancidity which has been stated in Sanskrit works to resemble that of cow's urine. The usual odour is that of leather. Its taste is bitter, saline, pungent and astringent. The partially purified specimens of this black substance, as brought down by the Bhuteas, are in the form of rounded flattened cakes about  $2\frac{1}{2}$  inches in diameter and half an inch thick, or in sticks resembling liquorice juice. Silajit is hygroscopic, and when exposed to a damp atmosphere becomes unctuous and sticky. In a dry state it is quite hard, and breaks with a shining black fracture, and in course of time some samples assume a brownish crystalline efflorescence on the surface.

Black silajit is soluble for the most part in distilled water, yielding a dark reddish-brown extract with an alkaline reaction. Ether, alcohol and other volatile liquids have little or no solvent action upon it. In one case ether extracted a small amount of a fatty compound having an odour of Russian leather. The aqueous solution is precipitated by mineral acids, plumbic acetate and ferric chloride, but not by acetic acid or alkalis. The aqueous solution is not precipitated by four volumes of alcohol. The organic matter is of the nature of an organic acid, and, in the specimens I examined, not one was of a bituminous nature.

There is a large quantity of mineral matter or ash left on incinerating the samples, and as this consists mainly of carbonated alkalis, it is indicative of the presence of one or more organic acids combined with bases in the original extract. In Dr. U. C. Dutt's "*Materia Medica of the Hindus*," p. 95, it is stated that the ashes left after burning silajatu on platinum foil, consist chiefly of lime, magnesia, silica, and iron in a mixed state of proto- and per oxide." It is said by the native doctors that the mineral constituents are regarded as impurities, and that the active principle is a cream-like body which rises to the surface of the liquid when the solid silajit is dissolved in hot water. The solution is placed in the



sun until it thickens, the surface is removed, and this *sut-silajit* is allowed to dry.

That there is no uniform combination between the organic and mineral constituents is shown in the analysis of two specimens of black silajit supplied by two Kabirajis of Calcutta.

	No. 1.	No. 2.
Water	7.95	9.34
Organic matter	35.05	55.36
Mineral matter	57.00	35.30
	<hr/>	<hr/>
	100.00	100.00
Ash soluble in water	10.90	24.4
soluble in acid	15.55	9.4
insoluble	30.55	1.5

A more complete examination was made last year of four additional samples: No. 1, round cakes from Calcutta; No. 2, long flattened cakes from Calcutta; No. 3, from Jaunsar, through the Director Imperial Forest School, Dehra Dun; No. 4 from Bashahr Forest, Punjab, through the Curator, Imperial Forest Museum.

	1	2	3	4
Water	9.85	15.90	11.15	10.99
*Organic matter	56.20	49.86	51.55	56.86
†Ash	34.95	34.24	37.30	32.15
	<hr/>	<hr/>	<hr/>	<hr/>
	100.00	100.00	100.00	100.00
*Including nitrogen	1.03	.82	3.25	1.26
†Containing				
Iron and alumina	2.24	1.08	6.00	4.64
Lime	4.36	3.96	3.86	3.88
Magnesia	1.50	.52	.15	1.34
Potash	9.07	6.69	3.71	6.10
Soda	4.11	7.63	1.07	.81
Phosphoric acid	.16	.25	.27	.20
Sulphuric acid	.58	.24	.34	.14
Chlorine	.07	.12	.11	.06
Carbonic acid, &c.	11.51	12.13	3.69	4.83
Silica	1.35	1.62	18.10	10.15

The chief ingredients of the ash are the bases lime, magnesia, potash and soda, combined as carbonates. The absence of a large iron and alumina precipitate indicates the non-identity of this substance with the mineral silajit of Nepal and Behar.

The bulk of the organic material consists of an acid which is related to humic acid, a principle which by the way is not usually administered by the general practitioner. When the aqueous solution is precipitated by hydrochloric acid, and the precipitate washed and pressed, it readily dissolves in warm alcohol. The lead salt of the organic acid separated from the filtered solution, washed and dried, afforded 54.91 per cent. of lead oxide. Heated in a dry test tube, the silajit evolved white alkaline fumes with a strong empyreumatic odour.

The crystals formed on the surface of cakes of black silajit are those of potassium and sodium carbonate.

There are a few points of resemblance between this article and the minerals belonging to the oxydised hydro-carbons. *Dopplerite*, for instance, (*Ber. Akad. Wien.* 2.287, 1899; 52.281, 1865) is an acid substance or mixture of different acids related to humic acid. It is insoluble in alcohol and ether. The ash ranges from 3 to 14 per cent. It is found in peaty beds, and shows the transition from peat to coal.

It will be necessary in a few words to refer to the third kind or white variety of silajit. Alum earth is sometimes supplied for this substance, but only as a fraudulent substitute. The original white silajatu is said to be obtained from crevices of rocks in the vicinity of Mount Abu, and this variety is used largely in Rajputana. A sample of white silajatu from Jeypur was shown to me two years ago. It was a cream-coloured crystalline compound with a strong nauseous odour. It was apparently of animal origin, and evolved gaseous ammonia when mixed with slaked lime. It yielded 64 per cent. of pure urea when determined from the amount of nitrogen given off by means of hypobromate of sodium. It was, therefore, crude urea or inspissated urine in a solid state. A reference to *Taleef Shereef or Indian Materia Medica*, edited in 1833 by Dr. George Playfair, throws some light upon this source of the drug. Art. 577. "*Silajeet* is the urine of the wild hill-goat, which, when the animal is rutting, is discharged on the stones and evaporated by the sun's heat. It is found in small quantities. Some have said it is the urine of the wild ass, found as above."

In the *Makhzhan-ul-adwiyah*, a Persian work on *Materia Medica* of great antiquity, it is said that silajit is generally found among the haunts of monkeys, and that the drug is the alvine discharge of a certain species with a black face and long tail. It distinguishes between the *salajit-i-asli*, a black gummy inodorous substance, and *salajit-i-nagli*, the evacuated substance with a nauseous odour and hard consistence. The medicinal virtues of silajit are set forth in the *Makhzhan-ul-adwiyah*. *Charaka*, *Susruta*, *Bhabaprokasha*, and Bagbhata's *Rasartna samuchchaya*.

It has heating properties, and is used in piles, leprosy, pleurisy, worms, asthma, gonorrhœa, and it is a specific for debility and for kidney and bladder diseases. Dr. Hem Chandra Sen, in a recent paper on "Shilajatu" in the *Indian Medical Record*, for 14th and 21st May, 1902, recommends it as digestive and laxative, suitable for dyspepsia, diabetes, diseases of the liver and spleen, to regulate the action of the heart, and as a good respiratory stimulant and expectorant. And finally, it is said to be a sheet anchor in diseases of the genito-urinary organs and of the nervous system. The *Taleef Shereef* says: "It is one of the most powerful remedies, and is stronger than any other ingredient in whatever formulæ it may form a part. It is the favourite medicine of all Hindu physicians." The author of *Charaka* says that there is no curable disease which will not yield to shilajatu in judicious combination with other drugs.

The medicinal uses of silajit are hence most varied, and it is difficult to realise what active therapeutic principles can affect this long list of ailments. Before European physicians can prescribe white, black, or brown silajit for any disorder, we must ascertain more exactly the nature of the chief ingredient, and be able to procure a regular supply of a uniformly prepared medicine. It is open to reason that no drug will become popular if no guarantee be given as to whether it belongs to the animal, vegetable or mineral kingdom.

Silajit is allied to another ancient drug named *momiyia* which has long been employed in the East. The original drug is said to have been made from Egyptian mummies, and subsequently to have been prepared by boiling down and extracting the essence of Abyssinian boys. Since the last source of supply has become scarce, several bituminous exudations are reported to have been substituted. There is little doubt that some forms of silajit may be entered in this category.

In conclusion, it will be necessary to alter the definition of this substance given in Indian glossaries. In a geological work it is called "Alum," and in more than one medical work it is termed "Bitumen;" but, from the evidence collated in the above notes, it is also an extractive matter containing an organic acid combined with alkalis, and almost completely soluble in water.

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